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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/539,718	07/20/2005	James Timothy Cronin	CH2883USPCT	2991
7590		06/23/2008	EXAMINER	
Jessica M Simott		NGUYEN, NGOC YEN M		
E I du Pont de Nemours and Company		ART UNIT	PAPER NUMBER	
Legal Patent			1793	
4417 Lancaster Pike		MAIL DATE	DELIVERY MODE	
Wilmington, DE 19805		06/23/2008	PAPER	

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/539,718

Filing Date: July 20, 2005

Appellant(s): CRONIN ET AL.

Jessica M. Sinnott
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed April 1, 2008 appealing from the Office action mailed December 31, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

The advisory action mailed April 11, 2008 stated that for purposes of appeal, the proposed amendments as presented in the after final amendment filed March 25, 2008 will not be entered.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

For the second ground of rejection, i.e. rejection of claims 1-11 over Kay et al (2,600,881) in view of Frey et al (2,591,021) and Cronin et al (2001/0016182), it should be noted that the rejection of claims "1-11" is an obvious typographical error because claims 1-11 had been cancelled. This rejection is for the pending claims 12-19 as correctly argued by Appellants in section (vii) of the Appeal brief.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

2,592,021	Frey et al	04-1952
2,600,881	Kay et al	06-1952
2001/0016182	Cronin et al	08-2001
GB-744,074	National Lead Company	02-1956

The preamble of the Jepson format claim 12 as the admitted prior art.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 12-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (the preamble of the Jepson claim 12) or GB 744,074, either one in view of Cronin (Cronin '182, 2001/0016182).

The admitted prior art, i.e. the preamble of the Jepson claim 12, discloses a process for purifying a crude titanium tetrachloride chlorinator discharge comprising titanium tetrachloride, aluminum chloride and vanadium chlorides, by mixing a vanadium passivating agent selected from the group consisting of organic oil into the chlorinator discharge to form a passivated discharge comprising one or more easy-to-separate vanadium-containing compounds.

Alternatively, GB '074 discloses a process for purifying crude titanium chloride to remove a major portion of the impurities therefrom which comprises refluxing the crude titanium tetrachloride in the presence of animal waxes (note claim 1). The impurities in the crude titanium tetrachloride include, for example, vanadium, silica, aluminum, niobium and tungsten (note page 2, lines 25-29). GB '074 teaches that for economical reasons a minimum amount of animal wax for effecting "substantially complete", which fairly suggests that the vanadium is not completely eliminated, purification of the crude titanium tetrachloride is preferred (note page 2, lines 109-112).

For the use a particular oil or animal fat, it would have been obvious to one of ordinary skill in the art to have selected a known and conventional oil or animal fat in the art to effectively remove the impurities, especially vanadium and/or aluminum from titanium tetrachloride through routine experimentation.

The difference is the admitted prior art or GB '074 does not disclose the step of adding an aluminum passivating agent which is selected from the group consisting of water, water containing solutions, water containing mixtures, and carboxylic acids.

However, in both the admitted prior art and GB '074, it is disclosed that the titanium tetrachloride contains chloride impurities such as chlorides of aluminum, vanadium, etc. (note: preamble of claim 12 and GB '074, page 1, lines 35-42) and the processes disclosed in the admitted prior art only disclose the removal of vanadium impurities.

Cronin '182 teaches that aluminum chloride present in the crude titanium tetrachloride is a highly corrosive material. It both quickly and severely attacks the metal materials of construction in the purification systems (note paragraph [0002]). The real-time control loop combined with the location of the addition of the passivating agent minimizes both the losses of titanium value from titanium tetrachloride reaction with excess concentrations of passivating agent and losses of service time from corrosion equipment and the formation of unwanted deposits (note paragraph [0039]).

Cronin '182 discloses an in-process, real-time control loop capable of controlling the passivation of aluminum chloride formed in the chlorination of titanium-containing ores by monitoring titanium oxychloride present in passivated crude titanium

tetrachloride comprising the steps: (a) rapidly mixing into a chlorinator discharge stream, where the stream comprises predominately vapor in the presence of liquid mist and solids, an aluminum chloride-passivating agent to form in the process stream an essentially non-corrosive aluminum containing compound, and titanium oxychloride; (b) measuring in-process the concentration of titanium oxychloride in the chlorinator discharge stream or in the crude titanium tetrachloride; (c) comparing the measured concentration of titanium oxychloride to that of an aim point concentration of titanium oxychloride; and (d) adjusting the rate of addition of the aluminum chloride-passivating agent to restore or maintain the concentration of titanium oxychloride at the aim point (note claim 1).

Cronin '182 teaches that the presence of titanium oxychloride in the process stream indicates that the aluminum chloride has been passivated (note paragraph [0031]) and the formation of titanium oxychloride represents a loss of titanium value (note paragraph [0032]). Thus, it would have been obvious to one skilled in the art to have verified the presence of aluminum impurity in the titanium tetrachloride stream before adding the aluminum passivating agent in order prevent losing titanium value. Cronin '182 also discloses that the probe or detector may be located in the immediate vicinity of (which can be immediately before or immediately after) the addition point for the aluminum chloride passivating agent or downstream and its actual location is not critical as long as it is located in an area where the titanium oxychloride will be in solution (note paragraph [0034]).

For the combined teaching of the applied references, the vanadium passivating agent and the aluminum passivating agent can be added to the crude titanium tetrachloride simultaneously to obtain a vanadium- and aluminum-passivated discharge, which is considered the same as the claimed "passivated discharge". It would have been obvious to one skilled in the art to have monitored the titanium oxychloride discharge to maintain the concentration of titanium oxychloride at the aim point. Thus, titanium oxychloride would always have been detected, and no additional aluminum passivating agent is needed to be mixed with the passivated discharge (note "if titanium oxychloride is absent" language in the instant claim 12).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have removed aluminum chloride impurity from the admitted prior art or GB '074 by using the process of Cronin '182 in order to have minimized both the losses of titanium and losses of service time from corrosion equipment that was caused by the aluminum chloride impurity. It would have been obvious to one skilled in the art to have carried out the process of Cronin '182 before, after or during the process of the admitted prior art or GB '074, as long as the advantages as stated above can be achieved.

Claims 12-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kay et al (Kay '881, 2,600,881) in view of Frey et al (Frey '021, 2,592,021) and Cronin '182.

Kay '881 discloses a process for the removal of aluminum chloride in solution with liquid titanium tetrachloride which comprises mixing with said liquid an amount of water sufficient only to react with the active aluminum chloride to be removed therefrom, and then separating the titanium tetrachloride from the resulting aluminum fluoride complex (note claim 1) by distillation (note claim 2).

Kay '881 teaches that the use of excess water is undesirable because loss of titanium values will occur due to formation of titanium oxychloride and the like (note column 5, lines 31-36). Kay '881 further teaches that besides the aluminum chloride impurity, the titanium tetrachloride contains other impurities such as vanadium (note table in column 6 and Example I). After the aluminum chloride is removed, the titanium tetrachloride is subjected to another purification step to remove color-imparting impurities such as a chloride of vanadium (note column 6, lines 30-35).

The differences are Kay '881 (1) does not disclose the use of an oil or animal fat to remove vanadium and (2) the step of monitoring the presence of titanium oxychloride in order to decide the addition of the aluminum passivating agent and (3) Kay '881 does not disclose the step of removing vanadium before the step of removing aluminum.

For (1), Frey '021 discloses a process for removing coloring impurities from titanium tetrachloride comprises intermixing said chloride and a small proportion of an organic compound selected from the group consisting of hydrocarbons and compounds

of carbon, hydrogen and at least one substituent from the group consisting of hydroxyl, oxy, keto, amino, and carboxyl radicals, heating said organic compound in the titanium tetrachloride to cause said compound to carbonizes therein and said impurities are taken up by said carbonization product, and separating purified titanium tetrachloride from said carbonization product holding said impurities (note claim 1 and Example 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to further have removed the vanadium impurity from the titanium tetrachloride of Kay '881 by using a known and conventional process as suggested by Frey '021 because such process would have provided an easy and cheap way of removing vanadium impurity from titanium tetrachloride (note Frey '021, column 2, lines 5-17).

For (2) Cronin '182 is applied as stated above to teach the in-process, real time control loop for the process of removing aluminum chloride from titanium tetrachloride to prevent the losses of titanium and the losses of service time from corrosion of equipment and the formation of unwanted deposits.

For (3), for the order of removing Al, V, see *Ex parte Rubin* , 128 USPQ 440 (Bd. App. 1959) (Prior art reference disclosing a process of making a laminated sheet wherein a base sheet is first coated with a metallic film and thereafter impregnated with a thermosetting material was held to render *prima facie* obvious claims directed to a process of making a laminated sheet by reversing the order of the prior art process steps.). See also *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946) (selection of

any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results.)

(10) Response to Argument

- * Rejection under 35 U.S.C. §103(a) over the preamble to Jepson claim 12 as admitted prior art or GB 744,074, either one in view of Cronin et al 2001/0016182.
 - For claims 12-13, 15-18.

Appellants argue that while using organic oil or animal wax in processes for removing vanadium was known, using organic oil or animal wax in such processes was not known for removing aluminum.

It should be noted that Appellants do not require that the organic oil was used to remove aluminum. In any event, organic oil is added to the crude titanium tetrachloride containing both aluminum chloride and vanadium chloride as disclosed in the preamble of claim 12 or GB '074, such organic oil would have removed not only vanadium as clearly taught in the preamble of claim 12 or GB '074 but would also inherently have removed aluminum as argued by Appellants because the step of adding organic oil to the crude titanium tetrachloride in the preamble of claim 12 or GB '074 is identical to the step required in Appellants' claim 12. Appellants might have discovered a new effect for an old process or process step, but this does not render the old process or process step novel or unobvious. Furthermore, as mentioned by Appellants on page 10 of the Brief, in Robinson (4,246,022), the titanium tetrachloride is purified by treatment with mineral oil, a mineral oil sludge residue often containing aluminum chloride, niobium chloride

and vanadium chloride thereby being produced (note column 1, lines 38-43). This fairly teaches that the mineral oil removes aluminum, niobium and vanadium impurities from the titanium tetrachloride.

Appellants argue that the use of organic oil or animal wax was not known for removing aluminum, the process for purifying a crude titanium tetrachloride by the process steps of detecting if titanium oxychloride is absent, and mixing an aluminum passivating agent into the vanadium passivated discharge in an amount sufficient to passivate the aluminum chloride and to form titanium oxychloride would not have been obvious.

As stated in the above rejection, aluminum chloride present in the crude titanium tetrachloride is a highly corrosive material, it both quickly and severely attacks the metal materials of construction in the purification system (note Cronin '182, paragraph [0002]). Thus, whether or not it is known that organic oil would have removed aluminum, it still would have been obvious to one skill in the art to have monitored the amount of titanium oxychloride present in the discharge stream and thereby adjusting the rate of addition of the aluminum chloride passivating agent to form an essentially non-corrosive aluminum containing compound and to maintain the concentration of oxychloride at an aim point (note paragraphs [0009]-[0013]) as suggested by Cronin '182. It should be noted that Appellants' claim 12 does not exclude the step of adding an aluminum chloride passivating agent before the step of "detecting".

Appellants argue that nonobviousness of the claimed process is especially apparent because it was not known that a passivating agent for aluminum chloride is a

product that results from using organic oil for passivation of vanadium in the crude titanium tetrachloride discharge.

This argument is not persuasive for the same reasons as stated above.

Appellants argue that the claimed feature of detecting the titanium oxychloride concentration is in the vanadium passivated discharged, not the aluminum passivated discharged as taught in the Cronin '182.

Firstly, it should be noted that the step of adding vanadium passivating agent as required in Appellants' claims forms a vanadium- and aluminum-passivated discharge because Appellants have stated that the organic oil (i.e. vanadium passivating agent) removes (i.e. passivates) both vanadium and aluminum. Secondly, Cronin '182 discloses that the concentration of titanium oxychloride is measured, in-process, in the chlorinator discharge stream or in the crude titanium tetrachloride (note paragraph [0012]). In any event, as evidenced by the teaching of GB '074, it is desirable in the art to remove impurities such as aluminum, vanadium, etc. from crude titanium tetrachloride. Cronin '182 teaches that the presence of titanium oxychloride in the process stream indicates that the aluminum chloride has been passivated and the formation of titanium oxychloride represents a loss of titanium value (note paragraphs [0031]-[0032]), thus, when the impurities are removed in sequence, it would have been obvious to one skilled in the art to have verified that there is at least some aluminum impurity in the crude titanium tetrachloride before adding an aluminum passivating agent by checking for the presence of titanium oxychloride in order to have minimized not only the loss of titanium value but also the cost of the aluminum passivating agent.

In the event the impurities are removed simultaneously, the aluminum passivating agent can be added (this step is not excluded by the language of Appellants' claim 12) together with the vanadium passivating agent in the process of the preamble of claim 12 or GB '074, and the discharge after such step is both a "vanadium passivated discharge" and a "aluminum passivated discharge" and by using the in-process monitoring as suggested by Cronin '182, such discharge would have always contained a concentration of titanium oxychloride at an aim point so that no aluminum passivating agent is required to be mixed into the passivated discharge (note "if titanium oxychloride is absent" limitation).

Appellants argue that a person of ordinary skill in the art of crude titanium tetrachloride passivation would not have considered trying to analyze the vanadium passivated titanium tetrachloride for titanium oxychloride concentration because vanadium passivated titanium tetrachloride streams can contain tenacious solids, as high as 50 to 60% which are difficult to deal with in the analytical equipment.

There is no sufficient evidence to show that the vanadium passivated titanium tetrachloride always contain high % of solids as argued by Appellants. Furthermore, it would have been obvious to have filtered the solids before analyzing the titanium tetrachloride for the titanium oxychloride concentration as evidenced by Cronin '182, paragraph [0034] which discloses that measurement of the concentration of titanium oxychloride may be made using transmission methods following the inline filtering or screening out of interfering particles.

- Claim 14

Appellants argue that claim 14 is directed to mixing the vanadium passivating agent into the chlorinator discharge in an amount sufficient to reduce the concentration of, but not eliminate, the vanadium chlorides.

Depending on the requirement for the purity of the titanium tetrachloride, i.e., if the titanium tetrachloride is not required to be completely free of vanadium impurity, it would have been obvious to one skilled in the art to have added a sufficient amount of vanadium passivating agent to remove just a sufficient amount of vanadium to obtain the desired purity for the titanium tetrachloride product as evidence by GB '074 that fairly teaches that for economical reasons a minimum amount of animal wax for effecting "substantially complete" (not total complete) purification of the crude titanium tetrachloride is preferred (note page 2, lines 109-112). It should be noted that Claim 14 does not require a "two step addition of the vanadium passivating agent".

- Claim 19

Appellants argue that claim 19 further comprises the second step of mixing vanadium passivating agent into the passivated discharged.

For the two step of addition of passivating agent, it would have been obvious to one skill in the art to have repeated a process step for a cumulative effect. There is no evidence of unexpected results or criticality for the two step addition of the vanadium passivating agent. As disclosed in Appellants' specification, paragraph bridging pages 4

and 5, the vanadium passivating agent can be added in a two step addition or in a single step addition.

* Rejection under 35 U.S.C. § 103 (a) in view of Kay et al. 2,600,881, Frey et al. 2,592,021 and Cronin et al publication.

- Claims 12-13 and 15-18

Appellants argue that Kay '881 discloses that after removing aluminum chloride, the titanium tetrachloride is distilled to remove impurities such as vanadium. Thus, Kay '881 would not have suggested or made obvious the claimed step of detecting titanium oxychloride in the vanadium passivated discharge.

It should be noted that Frey '021 is applied to suggest the step of adding an organic oil to remove vanadium impurity from titanium tetrachloride instead of the distillation step as disclosed in Kay '881. Regardless of the order of removing the impurities from a crude titanium tetrachloride, as clearly taught by Kay '881, when water is used to remove aluminum impurity, the use of excess water is undesirable because loss of titanium values will occur due to formation of titanium oxychlorides and the like. Thus, it would have been obvious to one of ordinary skill in the art to have monitored the amount of Al impurity in the titanium tetrachloride before and after the Al passivating step in order to add just a sufficient amount of water to remove the Al impurity with the amount of titanium oxychloride (as an indicator that all Al impurity has been passivated) maintained at a desired aim point as suggested by Cronin '182. In the event that the V

impurity is being removed first, the titanium tetrachloride "before" the Al passivating step would be the vanadium passivated stream as required by Appellants' claims.

- For claims 14 and 19.

The rejection is maintained for the same reasons as stated above.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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Application/Control Number: 10/539,718
Art Unit: 1700

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